Memorandum

Date January 7, 2008

To: James Johnston, Regional Administrator, DEQ IFRO

Thomas Rackow P.E., Staff Engineer, DEQ IFRO

From: Mike Spomer, Technical Services

Subject: **Staff Analysis for the *Draft* Wastewater-Land Application Permit for US DOE-Idaho Operations – Material and Fuels Complex (MFC) at Idaho National Labs (INL) -- LA-00160-01**

1. Purpose

The purpose of this memorandum is to satisfy the requirements of IDAPA 16.01.17.400.04 (Wastewater-Land Application Permit Regulations) for issuing wastewater land reuse permits (WLAP). It states the principal facts and significant questions considered in preparing the draft permit conditions and provide a summary of the basis for the draft permit. The analysis references applicable requirements and supporting materials as appropriate.

2. Process Description

Industrial wastewater, consisting primarily of continuous discharges of nonhazardous, nonradioactive, noncontact cooling water and steam condensate, periodic discharges of industrial wastewater from the MFC facility process holdup tanks, and precipitation runoff are discharged to the Industrial Waste Pond (IWP) from several MFC facilities with flow rates which total up to 13 million gallons per year.

3. Summary of Events

A wastewater Reuse Permit (WRP) application for the Idaho National Laboratory's (INL) Material and Fuels Complex (MFC), previously Argonne National Laboratory-West, Industrial Waste Pond (IWP) was originally prepared and submitted to the Idaho Department of Environmental Quality (DEQ) in January 1996. Because a permit was not issued at the time and the facility has since changed its name, in 2004 DEQ requested that MFC submit updated information on the facility's wastewater reuse system in order to issue a permit.

In June 2004, the IWP was cleaned out under a CERCLA remedial action to remove soil and sediments containing cesium-137, chromium, mercury, selenium, silver, and zinc contamination from past facility discharges. Following the cleanout, new baseline soil data was collected and analyzed and the IWP was placed back into service. Prior to the clean out, the wastewater from the facility was discharged into an open ditch within the facility fenced area. The water in this ditch generally infiltrated into the soil before it reached the IWP. In addition, there was no accurate way to determine the discharge volume or effluent characteristics. Following the clean out, the facility installed a pipe in the open ditch that captures all wastewater and discharges it at the inlet to the IWP. Currently there is a small, one (1) gallon per minute boiler condensate stream that continues to flow into the open south industrial ditch; however, the facility has indicated they are conducting an engineering study to collect this stream and tie it into the pipe. The facility has installed a composite sampler and sonic flow meter on the new wastewater discharge line. It should be noted, the sampler and meter are located within the fenced/secured area of MFC.

4. Discussion

The MFC is requesting a maximum hydraulic discharge of 13 MG per year going to the three (3) acre unlined industrial waste pond (IWP). The IWP has a design capacity of 285 MG with a maximum depth of thirteen (13) feet. Based on the soil conditions within the pond, the wastewater will rapidly infiltrate the soil and percolate down into the subsoil. This wastewater reuse system will be considered a rapid infiltration system as identified under IDAPA 58.01.17.200.24. The wastewater will be nonhazardous/nonradiological contaminated wastewater comprised of noncontact cooling water, boiler blowdown, cooling tower overflow and drain, air wash flows and steam condensate. Small amounts of industrial wastewater from the MFC facility process holdup tanks may also be discharged to the IWP system only after being approved by the facility supervisor and environmental staff.

1. **Soil Description:** Based on soil borings at MFC, there were two distinct horizons identified in the surface sediments. The upper portion, from zero to several feet below land surface (BLS), consists of light brown silty loam. This is underlain by sandy silt that extends to the basalt. There is no evidence of continuous sedimentary interbeds beneath the facility. The soils around the MFC facility have been mapped as Bondfarm-rock outcrop-Grassy Butte. While there is no data on actual water holding capacity, limited information provided in the application indicate percolation rates have yielded rates of 0.05 to 0.25 gallons per minute.

2. **Ground Water:** The INL site is within the recharge area for the Snake River Plain Aquifer (SRPA), recharge to the SRPA from the MFC is limited to precipitation and seepage from the IWP. Due to the high evap-transportation rates during the summer and early fall, infiltration from precipitation is considered to be insignificant.

   Using the transmissivities data of 29,000 to 556,000 ft^2 per day determined from the two production water wells on MFC, assuming an effective aquifer thickness of 250 feet, and a porosity of 10%, the horizontal groundwater flow velocity beneath the pond may range from 0.9 to 17 ft/day.

   There are several areas of perched water close to MFC that are small and appear to be localized zones of saturated conditions. In 1988, six boreholes were drilled adjacent to the IWP. Depth ranged from 54 to 423 feet. Three of the six holes encountered perched water in the 28 to 62 foot level. Only one had enough water to obtain a sample. The perched water chemistry was comparable to the IWP water quality. The localized, non-extensive nature of the shallow perched water was attributed to the small volume of industrial wastewater discharged to the IWP. The vadose zone at MFC is approximately 640 feet thick.

   The SRPA is the primary source of water upgradient and downgradient of MFC. The data from the groundwater monitoring well sampling does not show any constituent above water quality standards. Based on a review of the data comparing the upgradient well data with the down gradient well data, there is minimal increases in key constituents. For example, the TDS only increases 27 mg/L from 225 to 252 in one well and from 225 to 227 in the other well. Similarly for chlorides it increases from 13.2 mg/L in the up gradient well to 19 and 18.5 mg/L in the down gradient wells. Similar increases occur for nitrates, sulfates, iron and manganese. All are well below the primary and secondary constituent groundwater standard.

3. **Surface Water:** No permanent, natural, surface water features exist near the MFC. There are no designated flood plains (25, 50 or 100 year) adjacent to the MFC.

4. **Proposed Site Loading:** The facility discharges approximately 13.2 MG/yr (1.1 MG/month) of nonhazardous/nonradiological wastewater to the IWP, approximately 0.5 MG/yr of boiler condensate and 0.5 MG per year precipitation runoff (average 8.71 in/yr). The permittee has indicated that an annual discharge rate of 13 MG per year would be an expected level. The facility did reach peak flow of 26 MG in 2000. For 2004-2006, the estimated flow was 8MG/yr.

   A review of the analytical data from the monthly and annual samples data of the wastewater from 1999 thru 2006 was done. Comparing the data to the IDAPA 58.01.11.200 Ground Water Quality Rule Primary Constituent Standards (PCS) and Secondary Constituent Standards (SCS) limits, show all selected constituents typically fall within these limits. The exception is for iron, mercury and aluminum. (Note for aluminum and mercury, the reported values were less than instrument detection limits). A projected loading rate for Nitrogen is expected to be 6.9 lbs/ac/month and Chlorides is expected to be 168.6 lbs/ac/month. Total Suspended Solids (TSS) is expected to be 83.1 lb/ac/month.

   In the review of the analytical data from the wastewater, an average total coliform of 26,625 was listed. The facility was contacted and asked for an explanation since no sewage component was listed in the wastewater effluent. The facility responded that the samples collected were directly from the IWP water and that since sewage is not discharged to the pond that most likely source of coliform was from natural sources (rabbits, rodents, and waterfowl). This explanation seems reasonable.

5. **Site Management:** The DOE-Id controls all land within the INL, and public access is restricted to public highways and DOE-sponsored tours etc. Grazing of cattle and sheep is not allowed within 2 miles of any nuclear facility. The nearest MFC staff building is 500 feet to the southwest of the IWP. Due to the restricted nature of the INL site and the quality of the wastewater from MFC, it is recommended to not include any buffer zone restrictions in this permit. The facility was contacted about the potential for a radionuclide release into the IWP. It was indicated that there are no drains in areas containing radionuclides that go into the industrial wastewater system. They have a separate radioactive wastewater system and it is not associated with or connected to the industrial wastewater system.

6. **Compliance Activities:**

   - The Final Plan of Operations (Operation and Maintenance Manual or O&M Manual) should be updated following issuance of the permit to incorporate requirements of the final permit.
   - A solid waste management plan should be developed that would outline actions associated with the sampling and removal (dredging) of solids in the Industrial Waste Pond when needed.
   - The final construction and use of the new boiler blowdown line should be a permit condition to ensure the line gets installed in a reasonable timeframe.

Summary

Based on the information provided in the application and the proposed compliance activities, it is recommended to issue a draft permit for the MFC facility for 13 MG/year to be discharge to the Industrial Waste Pond using the new piping and metering system installed in 2007.

Staff recommends issuance of #LA-00160-01 as attached.

Attachments: WLAP #LA-00160-01 *Draft Permit*

LIST OF TABLES

LIST OF FIGURES

Table 1 - Permitted Hydraulic Management Units

HYDRAULIC MANAGEMENT UNITS

Serial Number	Description	Acres
MU-0016001	Industrial Waste Pond (IWP)	3

WASTEWATER SAMPLING POINTS

Serial Number	Description
WW-0016001	Composite sample of effluent in the pipe prior to discharge into IWP

SOIL MONITORING UNITS

Serial Number	Description	Associated MU
SU-00160-01	Sample of IWP (when dry)	MU-0016001

Table 2 - Ground Water Monitoring wells

Serial Number	**Description** (Site dedicated monitoring)	**Location**
GW-0016001	ANL-W-MON-A-012	Upgradient
GW-0016002	ANL-W-MON-A-013	Down gradient
GW-0016003	ANL-W-MON-A-014	Down gradient

Figure 1 - Vicinity Map

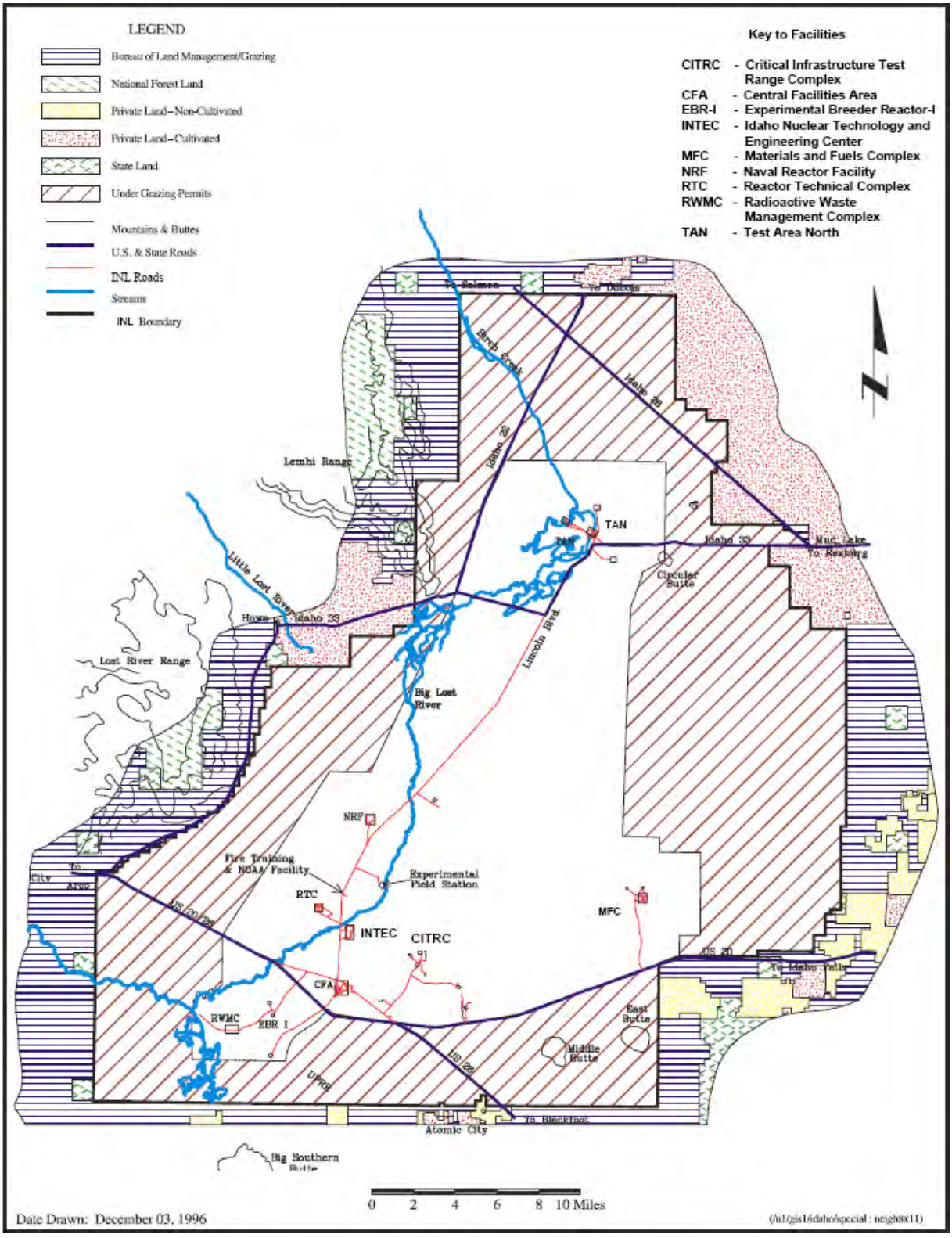

Figure 2 - Hydraulic Management Units

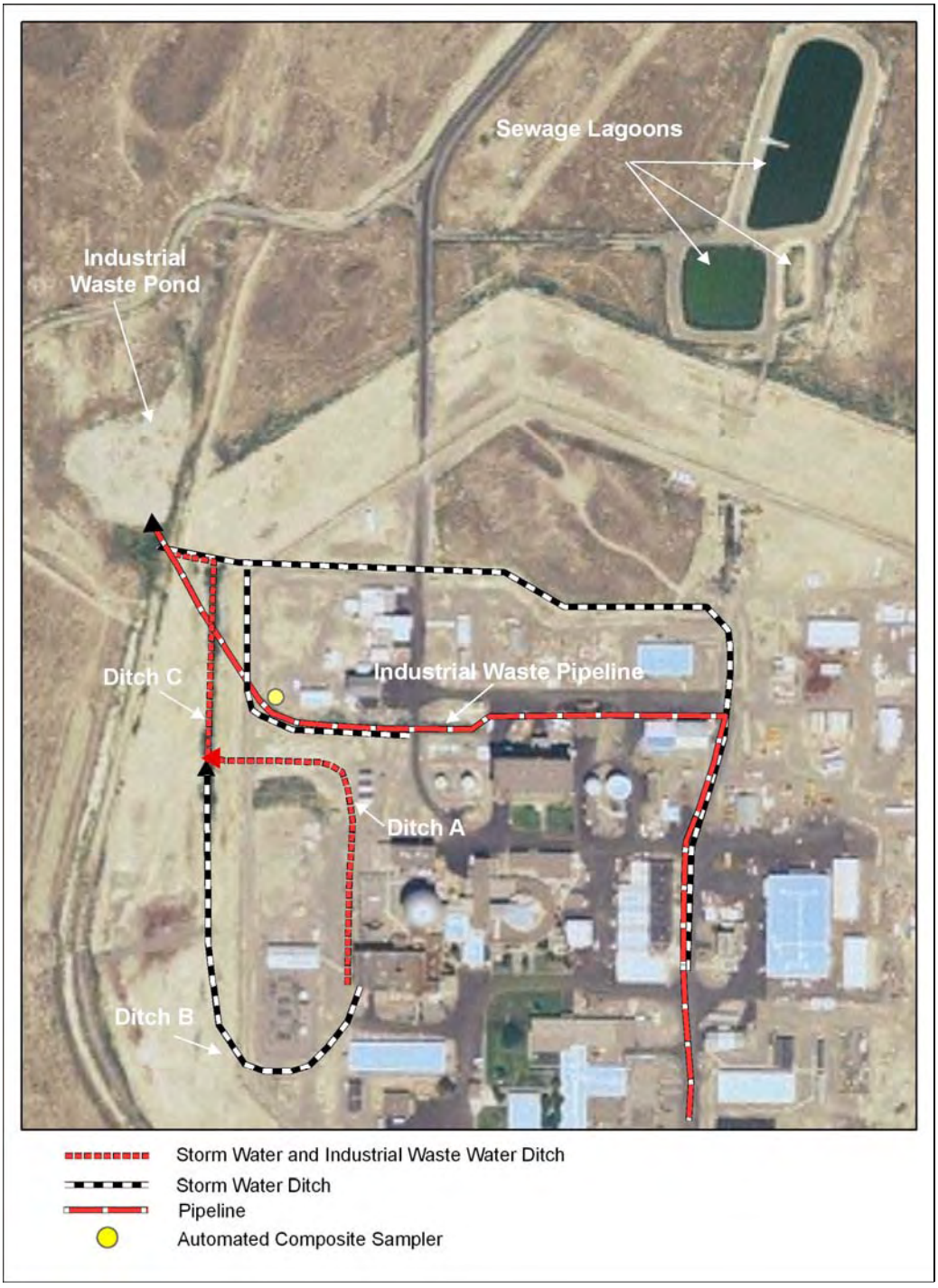

Figure 3 - Groundwater Monitoring Wells

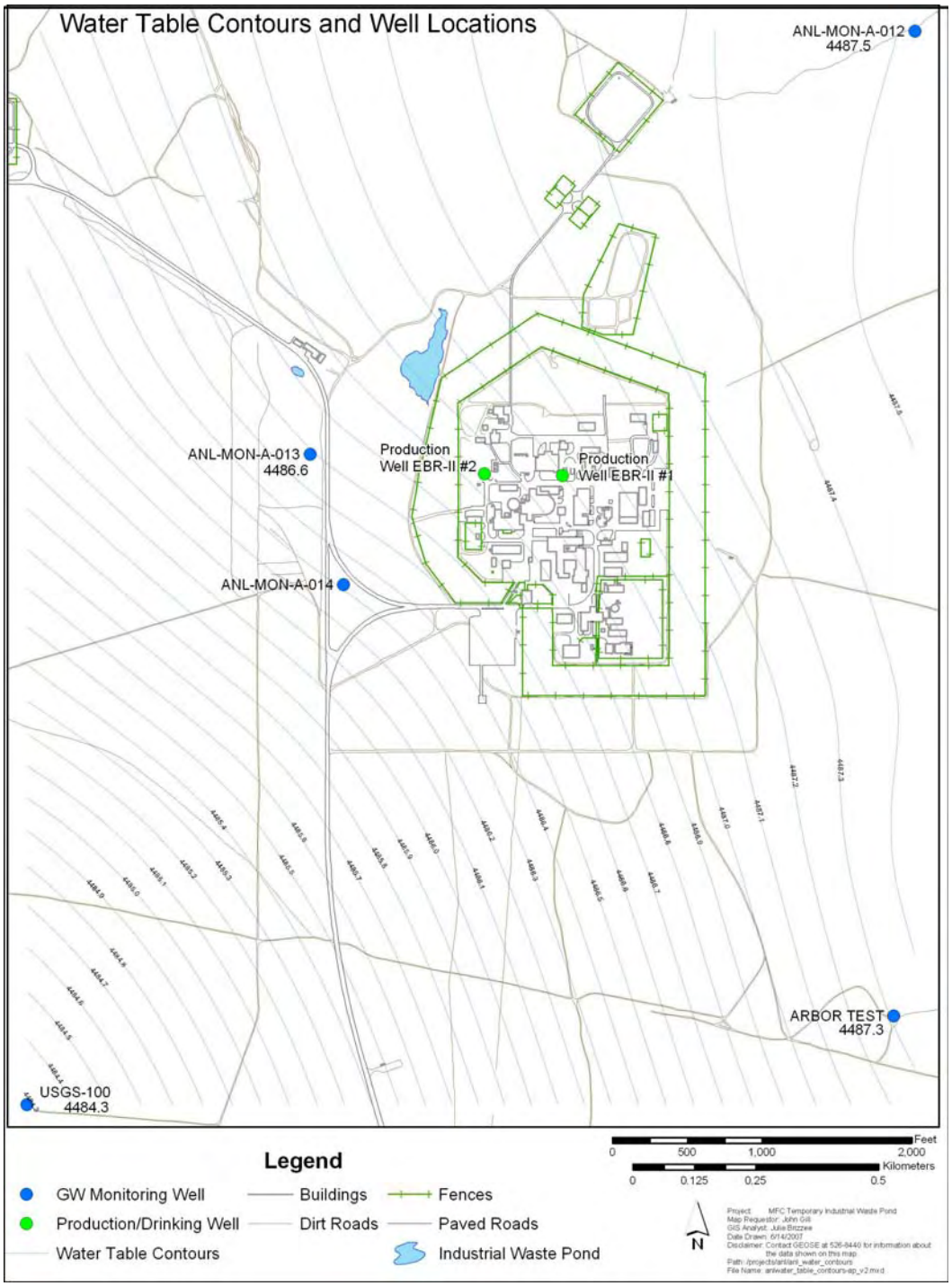

Figure 4 - Onsite Photo of Industrial Waste Pond (standing on NW side of pond looking SE)